One State's Experience with Non Transmission Alternative Solutions

The Boothbay, Maine NTA Pilot

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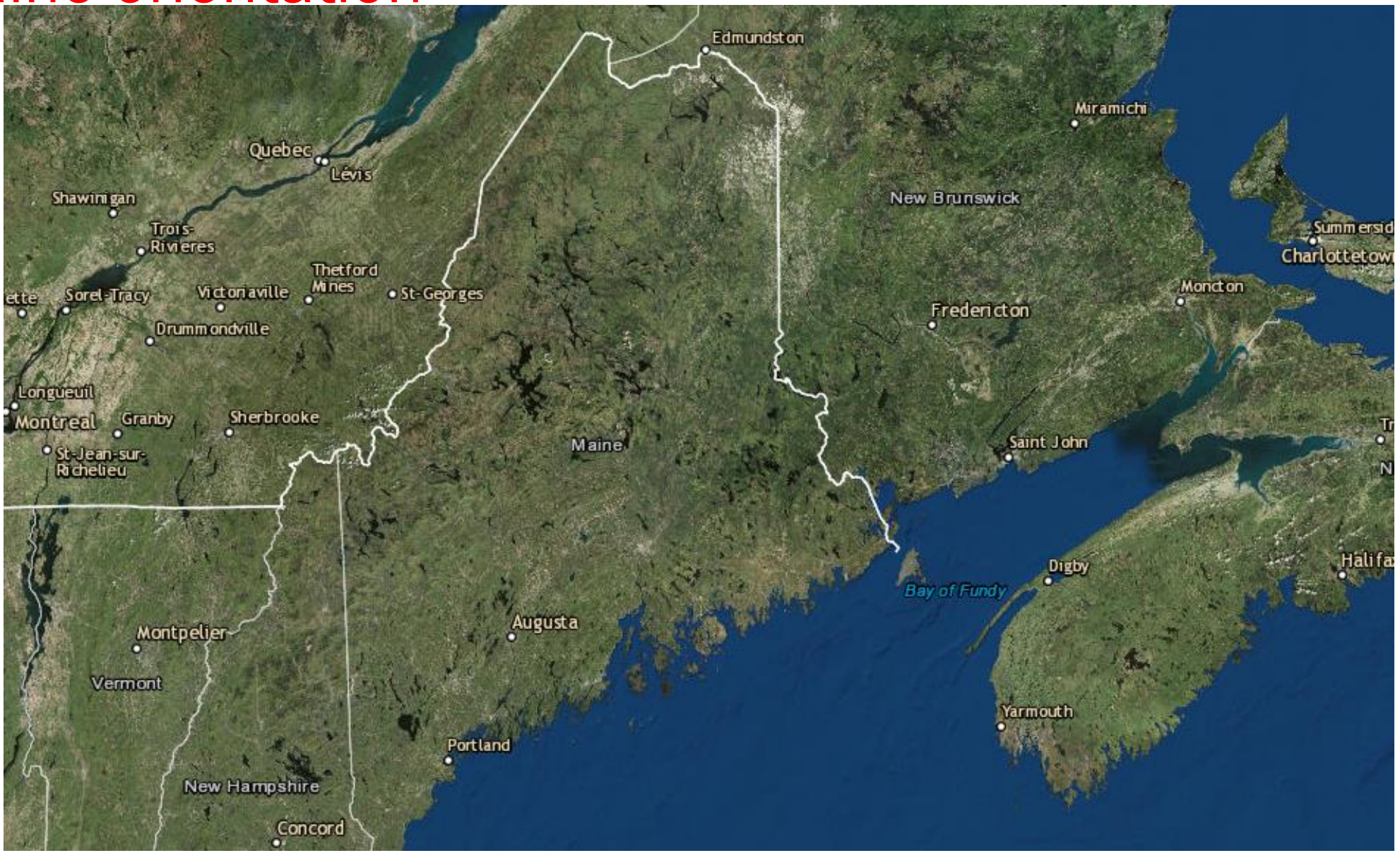
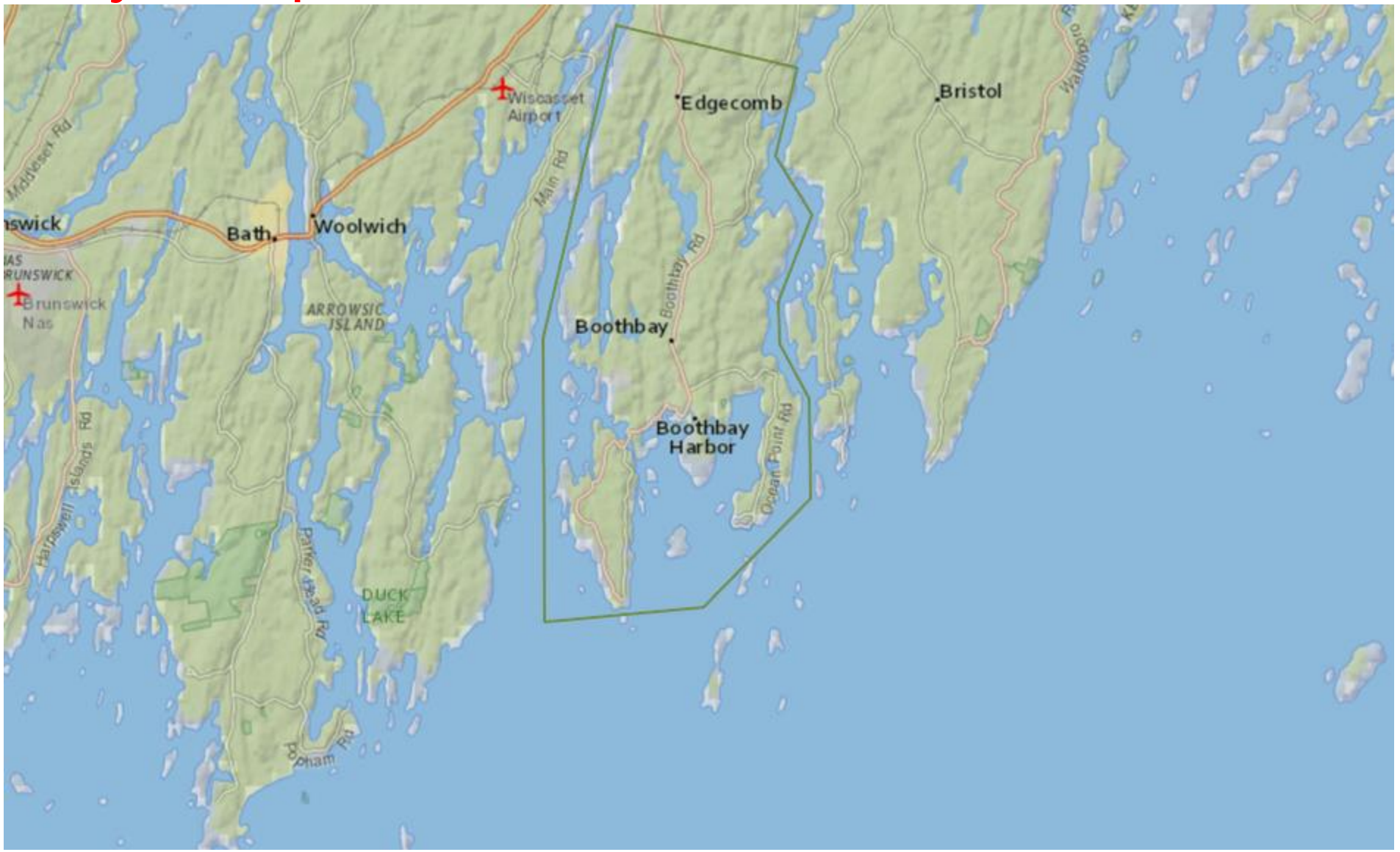
Maine orientation



Boothbay NTA pilot location



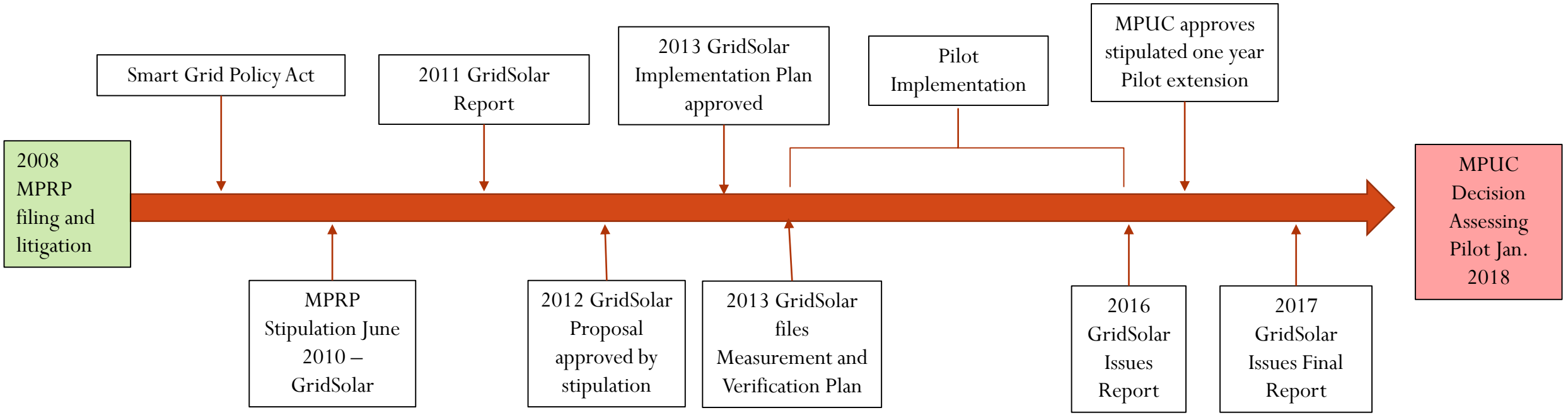
What is the policy backdrop that created the opportunity for the Boothbay Pilot?

- Merchant wind generation in central and northern Maine, load in southern New England
- Utility forecast of risks of imbalances on existing transmission
- Corrective actions might be traditional resources such as transmission upgrades, changes operational changes, addition of generation, or special protection systems.
- Boothbay Peninsula was one of several areas where expected load growth suggested a need for transmission upgrade on a radial
- NTA - Corrective actions may also be "non-transmission" or non-traditional solutions.
  - Rate applications
  - Distributed generation
  - Energy Efficiency
  - Storage
  - Demand response

Pilot project objectives – overview

- The Commission's initial approval of the Pilot rested on discovering information on the following issues;
  - Whether and what type of NTAs can be acquired at a reasonable cost to meet reliability requirements.
  - Whether and what were the best means by which the new advanced metering systems being deployed could provide the information and communications requirements to support NTA solutions.
  - Whether NTAs are capable of responding to provide grid reliability service.
  - Whether the Pilot's results can be scaled to meet requirements of other regions in Maine.

Policy Backdrop - Boothbay NTA Pilot



What was done? Who was involved? What went well and why?

- MPRP project transmission models indicated performance issues in Boothbay at a projected local area peak of 35.4 MW (2007 est).
- Legislation reacting to the MPRP project permitted the MPUC to consider allowing a "Smart Grid" coordinator.
- The stipulated settlement to the transmission proceeding anointed a sole source entity called "GridSolar" to serve as the Smart Grid Coordinator to develop non-transmission alternatives in Boothbay plus two other possible future locations.
- 2 MW of various non transmission measures were proposed to avoid the 35.4 MW critical load level peak.

Pilot project resources utilized

Resource	Capacity (kW)	Cost ($/kW/Mo.)	Performance
Energy Efficiency	256	$27.5	Consistent with expectations
Solar PV	211	$49.8	Consistent with expectations – fine tuning is possible.
Backup Generator	455	$17.4	Generally consistent performance – some start up issues.
Demand Response	23	$110	Difficulty confirming effectiveness of the response.
Energy Storage	500	$168.7	Initial start up issues and most expensive resource, but also most versatile and effective.
Load Shifting	230	$110	Difficulty confirming effectiveness of the response.
Total	1,675		

Operational experience

- Multiple resources at different costs were explored in the Pilot. In a competitive NTA process, it's reasonable to assume more cost effective resources would be selected.
- Short term duration of the Pilot may have distorted costs of resources that might be acquired for a longer duration project.
- Battery storage was the most expensive, but also the most effective resource. Battery costs continue their rapid decline – likely a place for battery resources in future NTAs
- Additional analytical tools are needed to understand the extent to which these results can be scaled to meet needs in different locations or regionally
  - Counterfactuals will always be challenging and often contentious – but very important
- Had a critical need arisen, some of the minor resource performance problems observed in the pilot may have affected reliability
- AMI Metering objective was never tested in the pilot. GridSolar developed and relied on its own communications system rather than utilize the host utility AMI/EMS network infrastructure.

Pilot conclusions

- NTAs might defer or reduce the stranded cost problem that can be created by lumpy transmission investments
- NTA potentially bring more modular, flexible demand and supply components.
  - Caveat - LT Contracts carry their own potential for stranded costs!
- Operational problems with some NTA resources suggest a need for redundant resources, or a larger reserve margin, to mitigate these problems.
- Communication among participating entities can pose challenges - the entire process was lengthy and politically contentious – looking for the adults in the room.
- NTA requirements and feasibility are highly specific to load characteristics of the NTA area.
- Further assessment of NTA solutions through the use of pilot projects is warranted.

Lessons Learned – Institutional

- Utilities receive higher allowed returns for transmission investment than distribution system investment.
- Smart Grid Coordinator was considered by MPUC as requested by legislature
  - New institution, contracting authority was proposed to offset any imbalance utilities might have
  - As proposed, could it introduce its own bias based on for-profit project advocacy and project development?
- MPUC - grid coordinator duplicates capabilities, ultimately can increase ratepayer costs, and bypass effective protections for ratepayers.
  - The time is right to get the incentive structure and rate design problem right.
  - Utilities see the writing on the wall.

What impact has the activity or initiative had in the state and on the grid?

- The forecasted critical area load level of 35.4 MW used in the transmission modelling never materialized – no way to test proposed load modification measures
- When tested for performance, technologies installed performed reasonably well
  - Some start up and communication issues were observed
  - Measurement and verification issues with Demand Response resources were also an issue
- Add a reserve margin for active DR. Resource is not 100% reliable so consider building in a reserve margin to increase resource diversity.
- NTA resources are location specific – this location had highly seasonal load issues.

What would you advise other state level decision makers to do differently based on your experience?

- Sound, reliable, proven engineering and economic facts will be the scarcest resource of them all
- Forecasting can justify any solution, wire, non-wire, or hybrid.
- Are we being all too human?
  - Asymmetries in perception - planning NTAs and DER in growth areas is easy, just as with traditional solutions
  - These are locationally specific solutions, so load declines or no-growth - outmigration, aging population, industrial shifts, economic changes – can happen and lead to stranded costs - which compounds rate effects on underlying economic/demographic challenges
- Lessons from these efforts will be quickly forgotten without the process and record created within the regulatory framework